

**Amendments to the Claims:**

This listing will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A rotary positive displacement machine comprising:  
a casing having a circular cylindrical internal surface delimiting an operating chamber;  
a rotor in the operating chamber, the rotor being mounted so as to orbit about a chamber axis which is the axis of the internal surface, the rotor having a circular cylindrical external surface, the chamber axis passing through the rotor, a generatrix of the external surface being adjacent to the internal surface, and a diametrically opposite generatrix being spaced from the internal surface;

a vane member mounted on the casing and being pivotable about a pivot axis parallel to the chamber axis, the vane member being accommodated in a fluid inlet/outlet aperture in the casing, the vane member having a passageway communicating between the exterior of the casing and the operating chamber, the vane member having an arcuate end face which is coaxial with said pivot axis and which has a length substantially equal to that of the rotor, the vane member having lateral faces extending from the respective lateral ends of the arcuate face towards said pivot axis, and the vane member having an arcuate tip face adjacent the rotor, said faces being sealing faces with respect to corresponding surfaces of the casing aperture and the rotor; and

a linkage which connects the vane member to the rotor so as to keep the tip face of the vane member in sealing contact with the external surface of the rotor, the linkage being connected to the vane member by an articulation having an articulation axis such that a plane containing the articulation axis and the axis of the external surface passes through the region of sealing contact;

wherein the rotor comprises a rotating inner part and a non-rotating outer part;

wherein said non-rotating outer part has a shallow arcuate recess which receives the arcuate tip face of the vane member;

wherein the linkage comprises an appendage connected to said non-rotating outer part at a location between the vane member pivot axis and said arcuate recess and connected to the vane member by said articulation; and

wherein said passageway traverses the vane member between the arcuate tip face and the pivot axis of the vane member.

2. (Original) A machine as claimed in claim 1, including a pair of discs at respective ends of the rotors, the discs rotating about the chamber axis in synchronism with the orbiting of the rotor and delimiting respective ends of the operating chamber.

3. (Previously presented) A machine as claimed in claim 2, wherein at least one of the discs constitutes a shutter covering at least one inlet/outlet port in the casing, the shutter having at least one passage with a first end which is in the operating chamber and a second end which is outside the operating chamber and which periodically overlaps said inlet/outlet port as the shutter rotates.

4. (Previously presented) A machine as claimed in claim 3, in which the second end of the passage is in the periphery of the shutter.

5. (Previously presented) A machine as claimed in claim 4, in which the passage is in the form of a slot open at the inner face and the periphery of the shutter.

6. (Previously presented) A machine as claimed in claim 3, in which there are a plurality of said passages arranged successively in the circumferential direction.
7. (Previously presented) A machine as claimed in claim 3, in which there are a plurality of said inlet/outlet ports arranged successively in the circumferential direction.
8. (Previously presented) A machine as claimed in claim 1, in which the casing has a plurality of fluid inlet/outlet ports.
9. (Previously presented) A machine as claimed in claim 8, including means for selectively closing the fluid inlet/outlet ports.
10. (Previously presented) A machine as claimed in claim 9, in which the closing means comprises a slider.
11. (Previously presented) A machine as claimed in claim 10, in which the slider is in the form of a ring extending around the casing.
12. (Currently amended) A machine as claimed in claim 1, in which said aperture in the casing extends from the surface corresponding to the arcuate end surface of the vane member, taken as 0°, over an angular range of up to 70°[, e.g., 40°].

13. (Previously presented) A machine as claimed in claim 12, functioning as a compressor, in which the fluid enters through the passageway in the vane member, and the casing has at least one evacuation orifice within an angular range of  $140^{\circ}$  from the end of said aperture.
14. (Previously presented) A machine as claimed in claim 12, in which the casing has at least one exit orifice within the angular range from  $240^{\circ}$  to  $360^{\circ}$ .
15. (Previously presented) A machine as claimed in claim 1, in which the casing has at least one exit orifice provided with a reed valve.
16. (Previously presented) A machine as claimed in claim 1, in which the external surface of the rotor has axial grooves providing a labyrinth-type seal between the rotor and the casing.
17. (Previously presented) A machine as claimed in claim 16, in which the groove depth is substantially the same as the groove width.
18. (Previously presented) A machine as claimed in claim 16, in which adjacent grooves define between them a fin having a width less than the groove width.
19. (Canceled)
20. (Canceled)

21. (Currently amended) A machine as claimed in claim ~~[[19]]~~ 1, in which the external surface of the outer part of the rotor has a coating of a compliant material, the coating having a series of axially extending grooves which enhance the deformability of the coating.
22. (Canceled)
23. (Previously presented) A machine as claimed in claim 21, in which each groove has one steep sidewall and one gradually sloping sidewall.
24. (Previously presented) A machine as claimed in claim 1, in which the linkage comprises a connecting link having one end articulated to an extension of the rotor on an axis coincident with the axis of the said external surface, and the other end articulated on the said articulation axis to a lever arm which is rigid with the vane member and which is pivotable about the said pivot axis.
25. (Previously presented) A machine as claimed in claim 24, in which the linkage further comprises balance links connected between the said rotor extension and the pivot axis.
26. (Canceled)
27. (Previously presented) An engine system as claimed in claim 36, in which at least two said machines are connected to the inlet manifold.

28. (Previously presented) An engine system as claimed in claim 27, in which at least one of the said machines is connected to the inlet manifold by a valve for selectively directing the airflow from the said one machine to the inlet manifold or to the atmosphere.

29. (Previously presented) An engine system as claimed in claim 27, in which a pair of the said machines is arranged in such a manner that out of balance forces oppose one another.

30. (Previously presented) An engine system as claimed in claim 27, in which at least one said machine is connected to an energy-using device and the rotor of the said machine is drivable by the pressure difference between ambient air and air at the inlet manifold.

31. (Previously presented) An engine system as claimed in claim 25, further comprising an exhaust turbine, preferably driving a compressor and/or a generator.

32. (Canceled)

33. (Canceled)

34. (Currently amended) A combined compressor and expander, comprising respective machines ~~according to claim 27~~, comprising an internal combustion engine having an inlet manifold, and at least one machine connected to the inlet manifold, wherein the at least one machine comprises:

a casing having a circular cylindrical internal surface delimiting an operating chamber;

a rotor in the operating chamber, the rotor being mounted so as to orbit about a chamber

axis which is the axis of the internal surface, the rotor having a circular cylindrical external surface, the chamber axis passing through the rotor, a generatrix of the external surface being adjacent to the internal surface, and a diametrically opposite generatrix being spaced from the internal surface;

a vane member mounted on the casing and being pivotable about a pivot axis parallel to the chamber axis, the vane member being accommodated in a fluid inlet/outlet aperture in the casing, the vane member having a passageway communicating between the exterior of the casing and the operating chamber, the vane member having an arcuate end face which is coaxial with said pivot axis and which has a length substantially equal to that of the rotor, the vane member having lateral faces extending from the respective lateral ends of the arcuate face towards said pivot axis, and the vane member having an arcuate tip face adjacent the rotor, said faces being sealing faces with respect to corresponding surfaces of the casing aperture and the rotor; and

a linkage which connects the vane member to the rotor so as to keep the tip face of the vane member in sealing contact with the external surface of the rotor, the linkage being connected to the vane member by an articulation having an articulation axis such that a plane containing the articulation axis and the axis of the external surface passes through the region of sealing contact;

wherein the rotor comprises a rotating inner part and a non-rotating outer part;

wherein said non-rotating outer part has a shallow arcuate recess which receives the arcuate tip face of the vane member;

wherein the linkage comprises an appendage connected to said non-rotating outer part at a location between the vane member pivot axis and said arcuate recess and connected to the vane member by said articulation; and

wherein said passageway traverses the vane member between the arcuate tip face and the pivot axis of the vane member, and wherein at least two said machines are connected to the inlet manifold;

the casings of the two machines being fixed end-to-end and having a common axis, and the rotor of the two machines being operatively connected to orbit in synchronism.

35. (Previously presented) A combined compressor and expander as claimed in claim 34, in which the orbits of the rotor of the two machines are offset in opposite directions with respect to the common axis.

36. (Currently amended) An engine system comprising an internal combustion engine having an inlet manifold, and at least one machine ~~according to claim 1~~ connected to the inlet manifold, wherein the at least one machine comprises:

a casing having a circular cylindrical internal surface delimiting an operating chamber;  
a rotor in the operating chamber, the rotor being mounted so as to orbit about a chamber axis which is the axis of the internal surface, the rotor having a circular cylindrical external surface, the chamber axis passing through the rotor, a generatrix of the external surface being adjacent to the internal surface, and a diametrically opposite generatrix being spaced from the internal surface;

a vane member mounted on the casing and being pivotable about a pivot axis parallel to the chamber axis, the vane member being accommodated in a fluid inlet/outlet aperture in the casing, the vane member having a passageway communicating between the exterior of the casing and the operating chamber, the vane member having an arcuate end face which is coaxial with said pivot axis and which has a length substantially equal to that of the rotor, the vane member



having lateral faces extending from the respective lateral ends of the arcuate face towards said pivot axis, and the vane member having an arcuate tip face adjacent the rotor, said faces being sealing faces with respect to corresponding surfaces of the casing aperture and the rotor; and  
a linkage which connects the vane member to the rotor so as to keep the tip face of the vane member in sealing contact with the external surface of the rotor, the linkage being connected to the vane member by an articulation having an articulation axis such that a plane containing the articulation axis and the axis of the external surface passes through the region of sealing contact;

wherein the rotor comprises a rotating inner part and a non-rotating outer part;

wherein said non-rotating outer part has a shallow arcuate recess which receives the arcuate tip face of the vane member;

wherein the linkage comprises an appendage connected to said non-rotating outer part at a location between the vane member pivot axis and said arcuate recess and connected to the vane member by said articulation; and

wherein said passageway traverses the vane member between the arcuate tip face and the pivot axis of the vane member.

37. (Currently amended) An engine system comprising an internal combustion engine having an inlet manifold, and at least one machine ~~according to claim 1~~ connected to the inlet manifold, and also comprising an exhaust turbine, with the exhaust turbine constituted by a machine ~~according to claim 1~~ comprising:

a casing having a circular cylindrical internal surface delimiting an operating chamber;

a rotor in the operating chamber, the rotor being mounted so as to orbit about a chamber axis which is the axis of the internal surface, the rotor having a circular cylindrical external

surface, the chamber axis passing through the rotor, a generatrix of the external surface being adjacent to the internal surface, and a diametrically opposite generatrix being spaced from the internal surface;

a vane member mounted on the casing and being pivotable about a pivot axis parallel to the chamber axis, the vane member being accommodated in a fluid inlet/outlet aperture in the casing, the vane member having a passageway communicating between the exterior of the casing and the operating chamber, the vane member having an arcuate end face which is coaxial with said pivot axis and which has a length substantially equal to that of the rotor, the vane member having lateral faces extending from the respective lateral ends of the arcuate face towards said pivot axis, and the vane member having an arcuate tip face adjacent the rotor, said faces being sealing faces with respect to corresponding surfaces of the casing aperture and the rotor; and

a linkage which connects the vane member to the rotor so as to keep the tip face of the vane member in sealing contact with the external surface of the rotor, the linkage being connected to the vane member by an articulation having an articulation axis such that a plane containing the articulation axis and the axis of the external surface passes through the region of sealing contact;

wherein the rotor comprises a rotating inner part and a non-rotating outer part;

wherein said non-rotating outer part has a shallow arcuate recess which receives the arcuate tip face of the vane member;

wherein the linkage comprises an appendage connected to said non-rotating outer part at a location between the vane member pivot axis and said arcuate recess and connected to the vane member by said articulation; and

wherein said passageway traverses the vane member between the arcuate tip face and the pivot axis of the vane member.

38. (Currently amended) A heat pump including a compressor and an expander, at least one of the compressor and expander being constituted by a machine ~~according to claim 1.~~

comprising:

a casing having a circular cylindrical internal surface delimiting an operating chamber;  
a rotor in the operating chamber, the rotor being mounted so as to orbit about a chamber axis which is the axis of the internal surface, the rotor having a circular cylindrical external surface, the chamber axis passing through the rotor, a generatrix of the external surface being adjacent to the internal surface, and a diametrically opposite generatrix being spaced from the internal surface;

a vane member mounted on the casing and being pivotable about a pivot axis parallel to the chamber axis, the vane member being accommodated in a fluid inlet/outlet aperture in the casing, the vane member having a passageway communicating between the exterior of the casing and the operating chamber, the vane member having an arcuate end face which is coaxial with said pivot axis and which has a length substantially equal to that of the rotor, the vane member having lateral faces extending from the respective lateral ends of the arcuate face towards said pivot axis, and the vane member having an arcuate tip face adjacent the rotor, said faces being sealing faces with respect to corresponding surfaces of the casing aperture and the rotor; and

a linkage which connects the vane member to the rotor so as to keep the tip face of the vane member in sealing contact with the external surface of the rotor, the linkage being connected to the vane member by an articulation having an articulation axis such that a plane containing the articulation axis and the axis of the external surface passes through the region of sealing contact;

wherein the rotor comprises a rotating inner part and a non-rotating outer part;

wherein said non-rotating outer part has a shallow arcuate recess which receives the arcuate tip face of the vane member;

wherein the linkage comprises an appendage connected to said non-rotating outer part at a location between the vane member pivot axis and said arcuate recess and connected to the vane member by said articulation; and

wherein said passageway traverses the vane member between the arcuate tip face and the pivot axis of the vane member.